NON-PUBLIC?: N
ACCESSION #: 9107020427
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Point Beach Nuclear Plant, Unit 1 PAGE: 1 OF 05

DOCKET NUMBER: 05000266

TITLE: Loss of Instrument Bus Resulting in Reactor Trip
EVENT DATE: 05/30/91 LER #: 91-005-00 REPORT DATE: 06/28/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Norm L. Hoefert, Manager - Operations TELEPHONE: (414) 755-2321

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: EE COMPONENT: INV MANUFACTURER: W120
REPORTABLE NPRDS: X

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On May 30, 1991, the Point Beach Nuclear Plant Unit 1 was operating at 100% power. At 1146, power to the Unit 1 red instrument bus was lost due to the failure of the inverter (1DY01) supplying the bus. This resulted in a reactor trip. However, loss of power to the bus does not directly cause a trip. The Plant Process Computer System (PPCS) sequence of event recorder did not indicate the exact cause of the trip. Start-up tests were performed and all results were satisfactory.

The instrument bus was transferred to the spare inverter and Unit 1 was started up and returned on line at 0047 on May 31, 1991. 1DY01 was subsequently repaired, tested, and returned to service supplying the Unit 1 red instrument bus.

END OF ABSTRACT

EVENT DESCRIPTION

On May 30, 1991, Point Beach Nuclear Plant Units 1 and 2 were both operating at 100% power. At 1146, the inverter (1DY01) supplying the Unit 1 red instrument bus failed, resulting in a loss of power to the bus and a reactor trip.

All systems functioned as designed after taking into account the temporary loss of power to all the instruments on the Unit 1 red bus. The reactor was placed in hot shutdown and the red instrument bus was transferred to the spare inverter (DY0A). Following the post-trip review, the reactor was started up and Unit 1 was placed back on line at 0047 on May 31, 1991.

COMPONENT AND SYSTEM DESCRIPTION

The vital 120Vac instrument supply system for each unit consists of eight buses divided into four channels designated red, white, blue, and yellow. One inverter is dedicated to each Unit 1 channel and one inverter is dedicated to each Unit 2 channel. A third swing inverter can be used to energize either the Unit 1 or Unit 2 buses of the same channel. Use of the swing inverter allows either dedicated inverter to be removed from service for maintenance.

Inverter 1DY01 is a Westinghouse Model 125CT 125Vdc to 120Vac inverter, Drawing WEST 500B448. The inverter was supplied as original plant equipment.

The Energy Industry Identification System component function identifier and system names for the system and component referred to in this LER are:

Inverter: 1DY01
System: EE
Component: INVT

CAUSES AND CORRECTIVE ACTIONS

The reactor trip resulted from the inverter failure, although temporary loss of power on an instrument bus will not directly cause a reactor trip. Following the post-trip review, the reactor was returned to service.

A maintenance work request was initiated to investigate the inverter failure and return it to working order. The investigation found three failed (shorted) diodes and a number of blown fuses. Two of these diodes were associated with the power supply to the master board. The diodes and fuses were replaced and the inverter was tested in accordance with RMP 36. No cause for the failure of the diodes has been determined. The Unit 1 red instrument bus was subsequently transferred back to 1DY01.

On the loss of power to the red instrument bus, a reactor trip may be expected on Steam Flow/Feed Flow Mismatch concurrent with a low level in the A steam generator. This is caused by the loss of the signal to, and closure of the A Main Feedwater Regulating Valve. The A steam generator level and feedwater flow controllers are powered from the red instrument bus. This trip is not instantaneous since the steam flow/feed flow mismatch must develop after the feed regulating valve begins to close. The PPCS sequence of event recorder also showed that both reactor trip breakers open at the same time. The first out reactor trip and turbine trip annunciators provided conflicting information, i.e., the reactor trip annunciators indicated that the reactor tripped from a turbine trip and the turbine trip annunciators indicated that the turbine tripped from a reactor trip.

The PPCS sequence of events recorder indicated that the reactor tripped, i.e., reactor trip breakers opened, prior to the time that the loss of feed flow trip occurred during this event.

Therefore, it was concluded that this trip could not have been caused by a logic channel failure since a single logic channel only trips the associated trip breaker and a random failure in two logic channels is unlikely. Normal start-up tests performed prior to restart verified that all permissives and low power trip functions were normal.

For its post-trip review of this event, the Managers Supervisory Staff concluded that the reactor trip was silent, i.e., not annunciated on the first out system or the PPCS. It also concluded that the trip was conservative in that it occurred prior to the reactor trip that would normally be expected when a red instrument bus inverter fails. Also, it was determined that additional testing was not necessary to determine the specific logic that tripped the reactor prior to start up. Based upon this, permission was granted to start up Unit 1.

During routine reactor protection system logic testing performed on June 18, 1991, a failed open contact was discovered on the PC431 logic channel from the blue pressurizer pressure channel. If this condition existed at

the time the loss of power to the red instrument bus occurred, an immediate B train reactor trip would have resulted. The PPCS sequence of event recorder and reactor trip first out annunciator would not indicate this event because the relay contacts to the PPCS and first out annunciator would remain in a non-trip state because the blue logic channel relay (PC431) did not trip. However, this would not cause a simultaneous trip of both the A and B train reactor trip breakers as indicated by the sequence of event recorder.

It is presently believed that the sequence of event recorder indications may not have been accurate. The B reactor trip breaker should have opened first resulting in a turbine trip and subsequent reactor trip signal opening the A reactor trip breakers. Historically, approximately 5 to 10 milliseconds have elapsed between the openings of the A and B reactor trip breakers upon a simultaneous A and B train reactor trip signal. Additional evaluations and testing as appropriate will be conducted to attempt to resolve this discrepancy. If new information leading to the exact cause of the trip is obtained, a supplement to this LER will be submitted.

GENERIC IMPLICATIONS

No known generic implications to this event have been identified at this time.

REPORTABILITY

This Licensee Event Report is being filed in accordance with 10 CFR 50.73(a)(2)(iv), "Any event or condition that resulted in the manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)."

The NRC was informed of this event in accordance with 10 CFR 50.72 (b)(2). The resident inspector was also informed.

SAFETY ASSESSMENT

There are no safety consequences to this event. Plant systems designed to shut down and maintain the reactor in a safe shutdown condition responded and operated as designed. The health and safety of the plant staff and the public were not endangered.

SIMILAR OCCURRENCES

A review of the maintenance history on the instrument bus inverters was performed. This included a review of the maintenance history of the red and blue channel inverters which are the original Westinghouse inverters. The white and yellow channel inverters are newer and made by Elgar. Other instances of failed diodes, one resulting in a loss of the instrument bus and a reactor trip, were found. These are summarized below:

INVERTER DATE SUMMARY

DYOA 11/20/76 Zener diodes shorted; no plant effects
1-DY01 08/04/79 Diode failure; no plant effects
1-DY01 11/17/86 Diode failure; reactor trip
2-DY01 04/08/88 Diode failure; no plant effects

There have been 16 other instances of inverter failure due to failed electronic piece parts other than diodes. These resulted in four reactor trips, one runback, and one planned shutdown. The remaining ten had no effect on plant operation.

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Wisconsin
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VPNPD-91-206 10 CFR 50.73
NRC-91-109

June 28, 1991

U. S. NUCLEAR REGULATORY COMMISSION
Document Control Desk
Mail Station P1-137
Washington, D. C. 20555

Gentlemen:

DOCKET 50-266
LICENSEE EVENT REPORT 91-005-00
LOSS OF INSTRUMENT BUS RESULTING IN REACTOR TRIP
POINT BEACH NUCLEAR PLANT, UNIT 1

Enclosed is Licensee Event Report 91-005-00 for Point Beach Nuclear

Plant, Unit 1. This report is being furnished in accordance with the requirement of 10 CFR 50.73(a)(2)(iv), "Any event or condition that resulted in the manual or automatic actuation of an Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)."

This event occurred when the Unit 1 reactor tripped as a result of the loss of the Unit 1 red instrument bus caused by the failure of the inverter supplying the bus.

Please contact us if you have any questions on the event or on our corrective actions.

Very truly yours,

C. W. Fay
Vice President
Nuclear Power

Enclosure

Copies to NRC Regional Administrator, Region III
NRC Resident Inspector

A subsidiary of Wisconsin Energy Corporation

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